

What is the relationship between alcohol intake and unintentional injury?

Conclusion

Strong evidence demonstrates that drinking in excess of current guidelines increases the risk of unintentional falls, motor vehicle crashes and drowning. When alcohol is consumed in moderation, the evidence for risk of unintentional injury is less well established for activities such as driving, swimming and athletic participation, but abstention from alcohol is the safest.

Grade: Strong

Overall strength of the available supporting evidence: Strong; Moderate; Limited; Expert Opinion Only; Grade not assignable For additional information regarding how to interpret grades [click here](#).

Evidence Summary Overview

This systematic review of 21 US and international studies dating back to 2004, included four systematic reviews (Cherpitel, 2007; Driscoll, Harrison, and Steenkamp, 2004; Gonzalez-Wilhelm, 2007; Kool, 2009), six cohort studies (Bedford, 2006; Driscoll, 2004; Hall, 2009; Hingson and Zha, 2009; Johnson, 2004; Mukamal, 2004;), five case-control studies (Kool, 2008; Kurzthaler, 2005; Sorock, 2006; Watt, 2004; Yoonhee, 2009), five cross-sectional studies (Hingson, 2009; Levy, 2004; McLean, 2009; Rehm, 2006; Watt, 2006) and one trend study (McDonald, 2004). Kool, 2009 and Watt, 2006 were deemed positive quality studies. Johnston and McGovern, 2004 was assessed as negative quality; all other studies were deemed to be neutral quality.

All of the studies found that alcohol consumption was positively associated with risk of unintentional injuries, and found associations with a wide range of different types of injuries. For example, many studies focused specifically on head injuries, spinal cord injuries and soft tissue injuries (Cherpitel, 2007; Hingson and Zha, 2009; Hingson, 2009; Johnston, 2004; Levy, 2004; McDonald, 2004; McLean, 2009; Norstrom, 2005; Rehm, 2006; Watt, 2006; Yoonhee, 2009) while others were related to fatal and non-fatal motor vehicle crashes (Bedford, 2006; Gonzalez-Wilhelm, 2007; Hingson and Zha, 2009; Hingson, 2009; Levy, 2004; Sorock, 2006), boating incidents (Driscoll, 2004) and all-terrain vehicle crashes (Hall, 2009).

Four studies found that even when consumed in moderation, alcohol consumption increases risk of falling (Kool, 2008; Kool, 2009; Kurzthaler, 2005; Mukamal, 2004; Sorock, 2006). Also, an association was shown between drinking alcohol and drowning (Driscoll, 2004; Driscoll, Harrison, and Steenkamp, 2004; Levy, 2004). Other areas of unintentional injury linked to alcohol consumption include suicide, fire-related injuries, and violence-related injury.

One study found evidence of a dose-response relationship between alcohol intake and injury (Kool, 2009), and several studies found that risk of unintentional injury tended to increase significantly after drinking two or more drinks per day (Kool, 2008; Mukamal, 2004; Watt, 2004).

Evidence Summary Paragraphs

Bedford et al, 2006 (neutral quality), a retrospective cohort study conducted in Ireland, identified

the blood alcohol concentrations (BAC) in persons who died as a result of accidental death or suicide through the review of coroner's records from 2001 to 2002. There were 129 deaths eligible for inclusion, 98 (76%) were male and 113 (87.5%) were adults aged 18 years and over; BACs were available for 83% of the subjects. Of the 129 deaths, 55 (42.6%) were road traffic accidents, 31 (24.0%) were suicides, 12 (9.3%) were substance misuse, 11 (8.5%) were house fires, 7 (5.4%) were industrial and farming accidents and 13 (10.1%) were classified as other accidents. Of the 55 who died in road traffic accidents, 22 (40%) had positive BACs ranging from 16mg per 100ml to 325mg per 100ml. Of the 31 who died as a result of suicide, 16 (55.5%) had positive BACs ranging from 13mg per 100ml to 317mg per 100ml. Of the 11 who died in house fires, the mean BAC was 225.2mg per 100ml. None of those who died as a result of an industrial or farming accident had alcohol detected in their blood.

Cherpitel, 2007 (neutral quality), a systematic review of international studies including 56 references, reviewed emergency room studies on alcohol and injury, using representative probability samples of adult injury patients. Findings supported prior reviews: Injured patients were more likely to be positive for blood alcohol concentration and report drinking within six hours prior to injury than non-injured patients, and the magnitude of the association substantially increased for violence-related injuries compared to non-violence-related injuries. However, indicators of alcohol use disorders did not show a strong association with injury.

Driscoll et al, 2004 (neutral quality), a retrospective cohort study conducted in Australia, examined the contribution of alcohol to drowning deaths through the review of deaths in the National Coroners Information System (NCIS) from July 2000 to June 2001. There were 6,259 total deaths that were not classified as natural cause deaths and 289 drowning deaths were identified; valid blood alcohol measurements were available for 137 (58%) deaths. The level of blood alcohol ranged from 0g per 100ml in 47% of cases, to 0.10g per 100ml or greater in 12% of cases. Alcohol contributed to approximately 19% of these fatal drowning incidents (25% for recreational aquatic activity, 16% for incidental falls into water, and 12% for drowning due to suicide), with blood alcohol levels for these cases ranging from 0.020g per 100ml to 0.375g per 100ml. Using greater than 0.10g per 100ml as the cut-off, the estimated all-ages proportion of unintentional drowning attributed to alcohol was 17%.

Driscoll, Harrison and Steenkamp, 2004 (neutral quality), a systematic review of 65 international references, assessed the role of alcohol in drowning associated with recreational aquatic activity. Of the 65 references, 10 were studies regarding alcohol involvement in deaths arising from recreational swimming, 13 were studies regarding alcohol involvement in deaths arising from recreational boating, and five were published estimates of risk or relative risk (RR) of fatal injury in relation to recreational aquatic activity. Surveys have consistently stated that approximately 30% to 40% of people on boats drink alcohol while on board, that men tend to drink more and behave in higher-risk aquatic activities in association with drinking than women, and that boater training is inadequate. Drowning appears to be the overwhelming cause of death associated with recreational aquatic activity, with alcohol detected in the blood of 30% to 70% of persons; alcohol may contribute to 10% to 30% of all recreational drowning deaths. Studies suggest that persons with a blood alcohol level of 0.10g per 100ml have about 10 times the risk of death associated with recreational boating compared with persons who have not been drinking; the risk of drowning increases with increasing blood concentration of alcohol.

Gonzalez-Wilhelm, 2007 (neutral quality), a systematic review of 31 international studies, determined the reported prevalence of alcohol and illicit drugs in blood specimens from drivers involved in traffic law offenses. Of the 31 studies, 11 represented studies of fatally injured drivers, nine represented studies of drivers who survived road traffic accidents, two represented studies of

drivers primarily suspected of driving under the influence of alcohol and nine represented studies of drivers primarily suspected of driving under the influence of drugs. Alcohol was the predominant substance, with a prevalence of 22.2% to 57.1% in studies of fatally injured drivers, 20.0% to 26.0% in studies of drivers who survived road traffic accidents, 88.1% to 95.5% in studies of drivers primarily suspected of driving under the influence of alcohol and 25.8% to 49.2% in studies of drivers primarily suspected of driving under the influence of drugs. However, in studies of drivers primarily suspected of driving under the influence of drugs, cannabinoids were more prevalent (26.1% to 59.3%).

Hall et al, 2009 (neutral quality), a retrospective cohort study conducted in the US, evaluated injury types and alcohol use in fatal all-terrain vehicle crashes. Cases were identified by searching the database of vital records at the Health Statistics Center of the West Virginia Department of Health and Human Resources for death certificates from 2004 to 2006. During that time, 112 fatal all-terrain vehicle crashes were identified; 101 (90.2%) were male, aged eight to 88 years (mean 35 years). Toxicologic testing was completed on 104 (92.9%) decedents, and 60 (57.7%) were positive for either alcohol or drugs of abuse, including opioid analgesics, diazepam, marijuana, cocaine and methamphetamine. Regardless of type of crash (traffic vs. non-traffic), 51 (49%) of decedents were positive for alcohol, and of those, 88% had blood alcohol concentrations higher than 0.08% (mean = 0.17%).

Hingson and Zha, 2009 (neutral quality), a prospective cohort study conducted in the US, explored whether early age of drinking onset is associated with respondents unintentionally injuring themselves and others when under the influence of alcohol. In-person interviews were conducted from 2001 to 2002 (wave one) in 43,093 adults aged 18 and older (mean age 45 years) from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), and 34,653 adults were re-interviewed from 2004 to 2005 (wave two). Analyses revealed that the younger respondents were when they started drinking, the greater the likelihood that, between the waves, they experienced alcohol dependence/abuse, drank five drinks per occasion at least weekly, drove under the influence of alcohol and placed themselves in situations after drinking where they could be hurt. In addition, between the waves, respondents who began drinking at earlier ages remained more likely to have unintentionally injured themselves and someone else when under the influence of alcohol. When respondents were under the influence of alcohol, 20% of those injured were other people, with more than one-third in traffic crashes.

Hingson et al, 2009 (neutral quality), a cross-sectional study conducted in the US, explored whether early drinkers take more risks even when sober by comparing potential associations between age of drinking onset and these outcomes after drinking relative to when respondents have not been drinking. Out of 5,778 current or former drinkers aged 18 to 39 from a national sample responding to a screening e-mail, 4,021 completed the survey (3,409 completed the survey online, 612 completed the survey by telephone). Of the 4,021 completing the survey, 1,225 were aged 18 to 25 years, 1,793 were aged 26 to 35 years and 787 were aged 36 to 39 years. Among all respondents, 38% had been a driver in a motor vehicle crash and 14% of those drivers were in accidents that occurred after they had been drinking; 34% reported being in a physical fight and 64% of them were in fights that occurred after drinking and 27% had been accidentally injured, with 50% of them injured after drinking. Compared with persons who waited until age 21 or older to start drinking, those who started drinking at age 14 years had 6.3 (95% CI: 2.6, 15.3) greater odds of having been in a motor vehicle crash after drinking, 4.6 (95% CI: 2.4, 8.7) greater odds of having been in a physical fight after drinking, and 5.2 (95% CI: 2.7, 10.2) greater odds of having been accidentally injured after drinking.

Johnston and McGovern, 2004 (negative quality), a prospective cohort study conducted in Ireland,

compared the pattern and severity of fall-related injuries in patients with or without alcohol exposure. A total of 351 healthy adults presenting to the Ulster Hospital between November 2001 and July 2002 with fall injuries were included in the analysis; 113 had consumed alcohol and 238 had not, based on appearance, and blood alcohol concentrations were measured for 47 patients giving consent. There was a significant difference in the pattern of injury between those who had consumed alcohol and those who had not ($P<0.001$) and there was a significant difference between groups in the Injury Severity Scores ($Z=-2.5$, $P<0.001$). For those who consumed alcohol, severity and pattern correlated with alcohol concentration at the time of injury; patients with an alcohol concentration less than 2g per L had mostly soft tissue limb injuries (58%), 2g to 2.5g per L had mostly significant limb fractures (55%) and more than 2.5g per L had mostly significant head injuries (90%).

Kool et al, 2008 (neutral quality), a population-based case-control study conducted in New Zealand, examined the contribution of alcohol to fatal and hospitalized injuries due to unintentional falls at home among working-aged adults. Cases were identified through each of the three trauma admitting hospitals for the region and the Coroner's office, and controls comprised a random sample of people from the General and Maori electoral rolls in the region. Interviews were conducted by telephone or face-to-face, and proxy interviews with next-of-kin or close friends were undertaken for cases who had died or who were too unwell to be interviewed. A total of 335 cases (180 females, 155 males, mean age 45.9 years) and 352 controls (208 females, 144 males, mean age 44.6 years) were interviewed; blood alcohol measurements were only available for cases. The consumption of two or more standard alcoholic drinks in the preceding six hours relative to none was associated with a significantly increased risk of fall-related injury [for two standard drinks: $OR=3.7$ (95% CI: 1.2 to 10.9), for three or more drinks: $OR=12.9$ (95% CI: 5.2 to 31.9)]. Approximately 20% of unintentional falls at home may be attributable to the consumption of two or more drinks in the preceding six hours.

Kool et al, 2009 (positive quality), a systematic review of eight studies published in the US, Finland, Sweden and Canada, appraised the published epidemiological evidence quantifying the risk of falls associated with acute and usual alcohol consumption among young and middle-aged adults. Of the eight studies, four were case-control studies, three were cohort studies and one was a case-crossover study. The proportion of fall subjects who had been drinking within six hours of the event ranged from 14% to 53%; acute alcohol use accounted for at least a three-fold increase in unintentional fall risk. Modest evidence of a dose-response relationship with acute alcohol use was observed; however, the association between usual alcohol use and fall risk was inconclusive.

Kurzthaler et al, 2005 (neutral quality), a case-control study conducted in Austria, obtained an epidemiologic measure of the relationship between fall-related accidents and alcohol consumption and benzodiazepine use in patients. Cases were patients admitted to the emergency room injured by falls over a 12-month period, and controls were patients admitted for accidents of other causes. A total of 615 cases (44.1% male, 55.9% female; mean age 64.8 ± 20.8 years) and 996 controls (74.1% male, 25.9% female; mean age 40.5 ± 16.2 years) were included in the analysis. Of the 615 cases, 22% tested positive for alcohol, 55% tested positive for benzodiazepines, and 1.5% tested positive for both substances. A significant number of males tested positive for alcohol than females (40.2% vs. 7.6%). The percentage of both male and female patients who had consumed alcohol at the time of the accident decreased significantly with age, across all age groups ($P<0.001$). In persons up to 70 years of age, the consumption of alcohol in males and females was substantially higher in patients hurt by a sudden fall (males = 49.7%, females = 18.9%) than in an age-matched sample of patients involved in accidents of other causes (males = 20.6%, females = 3.1%, $P<0.001$).

Levy et al, 2004 (neutral quality), a cross-sectional study conducted in the US, examined the

relationship between alcohol involvement and outcome of injury (both fatal or non-fatal) by sex, age, race, time and the cause of injury using multiple years of data on fire and scald burns, submersions, spinal cord injuries and traumatic brain injuries. Data between 1988 and 1992 were obtained from a statewide, population-based injury surveillance system in Oklahoma. Alcohol involvement was defined as the percentage of people who imbibed alcohol on an average day. A total of 11,376 injured persons were studied and alcohol was known for 8,346 persons (73%), with 86% of fatalities and 69% of non-fatal cases. Total alcohol involvement ranged from 3.8% in scald burns to 34.2% for spinal cord injuries. In fire burns, mean alcohol involvement was significantly higher among persons killed than among survivors (30.7% vs. 11.0%, $\chi^2=101.1$, $P<0.001$). A greater percentage of fatal non-work-related unintentional cases (32.5%) than non-fatal cases (11.7%) were alcohol involved ($\chi^2=88.8$, $P<0.001$). Among non-fatal cases, a greater percentage of non-work-related unintentional injuries (11.7%) than work-related unintentional injuries (3.1%) were alcohol involved ($\chi^2=14.8$, $P<0.001$). In scalds and other burns, mean alcohol involvement was similar among persons killed and among survivors (5.6% vs. 3.8%, $\chi^2=0.2$, NS). Because of the small sample size of fatal non-work-related scald victims, comparisons were not made between fatal and non-fatal cases. In submersions, total alcohol involvement was similar for unintentional (23.9%) and intentional (17.4%) cases ($\chi^2=0.5$, NS). Fatal cases were significantly more likely to be alcohol involved (31.0%) than non-fatal cases (6.2%) ($\chi^2=43.0$, $P<0.001$). Alcohol-involved submersion cases were more than two times more likely to be fatal than non-alcohol-involved cases ($P=0.08$), even when controlling for victim age. Spinal cord injuries: Alcohol involvement between fatal and non-fatal cases (33.3% vs. 34.1%, $\chi^2=0.1$) was not significant (NS). Among SCI cases associated with motor vehicle crashes, total alcohol involvement was slightly higher among non-fatal cases (42.3%) than among fatal cases (34.2%) ($\chi^2=2.4$, ns). Among non-fatal SCI cases, alcohol involvement was nearly twice as high in intentional (48.4%) than in unintentional (25.8%) injuries ($\chi^2=12.4$, $P<0.001$). In traumatic brain injury, of cases with known alcohol involvement, 38.5% of fatal and 42.3% of non-fatal cases involved alcohol ($\chi^2=4.8$, $P<0.05$). Alcohol involvement was higher among males (45% of cases) than females (27% of cases) ($\chi^2=117.2$, $P<0.001$). Nighttime and alcohol-involved injuries were slightly less likely to be fatal ($P<0.001$).

McDonald et al, 2004 (neutral quality), a trend analysis conducted in the US, examined the alcohol-related emergency department visits through the review of data from the National Hospital Ambulatory Medical Care Survey (NHAMCS) from 1992 through 2000. During these nine years, there were an estimated 68.6 million (95% CI: 65.6 to 71.7 million) emergency department visits attributable to alcohol, a rate of 28.7 (95% CI: 27.1 to 30.3) per 1,000 US population; the number of alcohol-related visits increased 18% during this period. Emergency department visit rates for diagnoses with alcohol-attributable fractions of one were highest for those who were aged 30 to 49 years, male and black.

McLean et al, 2009 (neutral quality), a cross-sectional study conducted in New Zealand, examined information regarding alcohol use and drinking location in order to better inform planning for local strategies to reduce alcohol-related harm in the future. Data was collected from first-presentation injury consultations for patients 16 years and older at three primary care facilities over a two-month period. A total of 317 eligible survey responses were obtained. The overall response rate was 71%. The age range of respondents was 16 to 84 years, with a mean age of 32 years and median age of 26; 37% of respondents were female. The anonymous survey provided information about the nature of the injury, alcohol use in the six hours prior to injury and identification of the location where the last drink was consumed. The results showed that 17% of respondents had had an alcoholic drink in the six hours prior to injury. Of this group, 36% had had moderate intake of alcohol and 64% a hazardous intake according to the Alcohol Advisory Council of New Zealand criteria for the maximum number of standard drinks on one drinking occasion of four for women and six for men.

The mean number of standard drinks recalled by drinkers in the survey was nine. When comparing drinkers with non-drinkers (those who had not had a drink in the previous six hours), a greater proportion of women likely to be drinkers than men ($P=0.005$). Tertiary students were significantly more likely to have be drinkers ($P<0.001$). The mean age of drinkers was 21 years (95% CI: 19.6 to 22.8 years), and of non-drinkers 35 years (95% CI: 32.8 to 36.6 years). There was a statistically significant difference between the groups ($P<0.0001$) with respect to age. The mean number of standard drinks was 8.9 (median 7.7, SD 6.7). There was a significant association between hazardous intake and attributing one's injury to alcohol with those with hazardous intake more likely to attribute their injury to their drinking ($P=0.002$). The majority of drinkers (62%) had their last drink at a house or flat.

Mukamal et al, 2004 (neutral quality), a prospective and cross-sectional observational study conducted in the US, examined the relationship between alcohol consumption and risk of falls in 5,841 older adults (men and women aged older than 65 years) enrolled in the Cardiovascular Health Study. Self-reported alcohol intake was recorded at baseline and included the number of drinks and frequency of consumption of beer, wine and spirits. Subjects were asked whether they changed their pattern of consumption during the previous five years and whether they ever regularly consumed five or more drinks daily. Data on self-reported falls was taken at baseline and every six months for four years. Cross-sectional analysis showed that before and after adjustment, prevalence of frequent falls was highest in abstainers and lowest in subjects who consumed 14 or more drinks per week ($P=0.06$). Longitudinal analysis results in no difference between abstainers and light to moderate drinkers in their risk of falls during follow-up. Subjects that consumed 14 or more drinks per week had a significantly higher risk of falls than abstainers in adjusted analyses (OR=1.25, 95% CI: 1.03 to 1.52, $P=0.07$). The HR for incident falls associated with consumption of 14 or more drinks per week was 1.20 (95% CI: 0.97 to 1.47) for white subjects and 1.51 (95% CI: 0.78 to 2.91) for black subjects. No interactions were found in subjects younger or older than 75, men or women or subjects who reported physical activity or gait speed were above or below the median level ($P>.$ 2) for all.

Rehm et al, 2006 (neutral quality), a cross-sectional study examined the proportion of deaths "caused" or "prevented" by alcohol and premature deaths in Canada for 2001. Randomly drawn sample (initial $N=13,090$; final $N=47\%$ response rate; age greater than 15 years) from data taken from the Canadian Addiction Survey collected between 2003 and 2004. Subjects were interviewed by phone and completed a questionnaire that included seven-day self-reported alcohol intake. The analyses adjusted for drinking category, age and sex. Men consumed on average more than women and alcohol consumption decreased with age. The overall average age for an alcohol-attributable death was 45.9 years for men and 58.8 years for women. 3,892 alcohol-attributable deaths were estimated, accounting for 3,313 deaths among men and 579 among women. Among deaths caused by alcohol, the three biggest contributors were unintentional injuries, malignant neoplasms and digestive diseases.

Sorock et al, 2006 (neutral quality), a case-control study conducted in the US, determined the associations between drinking history and fatal injuries in the elderly, mainly from falls, motor vehicle crashes and suicides. A total of 1,735 cases (389 males, 339 females, aged 55 years and older) were selected from the 1993 National Mortality Follow-Back Survey, which provided national estimates of alcohol usage and demographic information among people who died from injuries and 13,381 controls (5,065 males, 8,316 females, aged 55 years and older) were selected from the 1992 National Longitudinal Alcohol Epidemiologic Survey, which provided national estimates of alcohol usage for the general public. Analysis indicated that 36% of cases and 29% of controls consumed 12 or more drinks in the prior 12 months. The unadjusted relative odds for drinkers vs. non-drinkers for falls was 1.7, for motor vehicle crashes was 1.7, and for suicides was 1.6. Drinking increased the risk

of suicide more for women than for men; the adjusted odds ratio of suicide for women drinkers vs. non-drinkers was 2.5 (95% CI: 1.67 to 3.68), while for men drinkers vs. non-drinkers was 1.3 (95% CI: 1.00 to 1.65).



Watt et al, 2004 (neutral quality), a case-control study conducted in Australia, quantified the relationship between acute alcohol consumption and risk of injury, in the context of other potential confounding factors, such as substance use and risk-taking behavior. Of 727 patients aged 15 years and over that were treated at the emergency department for an injury, 543 were interviewed and 488 (311 males, 177 females) were included in the analysis, as well as 488 population controls matched for gender, age group, neighborhood, day and time of injury. After controlling for demographic and situational variables, consuming any alcohol in the six hours prior to injury significantly increased risk of injury [OR=2.13 (95% CI: 1.3 to 3.9)], and drinking at levels above low-risk guidelines (higher than 40g alcohol per occasion for females, higher than 60g alcohol per occasion for males) increased injury risk by a factor of approximately 2.5 [OR=2.41 (95% CI: 1.1 to 5.2)]. In addition, drinking beer [OR=1.86 (95% CI: 0.9 to 3.9)], spirits [OR=3.05 (95% CI: 1.1 to 8.2)] or a combination of beverages [OR=3.16 (95% CI: 1.1 to 8.8)] increased risk of injury. When usual alcohol consumption patterns, risk-taking behavior and substance use were considered, changes in the effect of alcohol on injury risk were observed, demonstrating that the relationship between alcohol and injury appears confounded by these variables.




Watt et al, 2006 (positive quality), a cross-sectional study conducted in Australia, determined whether injury mechanism among injured patients is differentially distributed as a function of acute alcohol consumption. Every injured patient who presented to the Gold Coast Hospital Emergency Department for treatment of an injury sustained less than 24 hours prior to presentation was approached for an interview; 1,205 patients were approached, 789 were eligible and 593 injured patients (377 males, 216 females) were included in the final analysis (aged over 15 years). After adjustment for confounding variables, neither quantity nor type of alcohol was associated with injury mechanism; however, drinking setting was significantly associated with odds of sustaining an intentional vs. unintentional injury [OR=2.79 (95% CI: 1.4 to 5.6)], injury through being hit by or against something vs. other injury types [OR=2.59 (95% CI: 1.4 to 4.9)] and reduced odds of sustaining an injury through road traffic crashes vs. non-road traffic crashes [OR=0.02 (95% CI: 0.004 to 0.9)], compared with not drinking alcohol prior to injury.



Yoonhee et al, 2009 (neutral quality), a case-control study conducted in South Korea, evaluated the effects of alcohol consumption on injury type and severity in emergency department trauma patients. Of 1,188 patients requiring admission, the majority did not provide consent; of 407 patients, there were 123 cases in the intoxicated group (male:female ratio = 7.1:1, mean age 39±13.7 years) and 284 non-intoxicated controls (male:female ratio = 2.1:1, mean age 45.6±19.0 years). Head Abbreviated Injury Scale (AIS) score was significantly higher in intoxicated patients compared to non-intoxicated controls (1.1±1.7 vs. 0.6±1.2, P=0.008) and mortality was significantly higher in intoxicated patients than non-intoxicated controls (5.7% vs. 2.0%, P=0.003). There was a significantly higher number of intoxicated patients with severe injuries than non-intoxicated controls (21% vs. 11.7%, P=0.023) and specifically with head injuries (25.7% vs. 13.3%, P=0.004). There was NS difference found in the total length of hospitalization. However, the length of the intensive care unit admission was significantly longer in the intoxicated patients than in the non-intoxicated controls (1.9±4.6 days vs. 0.7±2.6 days, P<0.05).



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Author, Year,	Population/Subjects	Significant Outcomes
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Study Design, Class, Rating		
<p>Bedford, O'Farrell and Howell 2006</p> <p>Study Design: Retrospective Cohort Study</p> <p>Class: B</p> <p>Rating: </p>	<p>Reviewed coroner's records from 2001 to 2002.</p> <p>N=129 deaths eligible for inclusion, 98 (76%) male and 113 (87.5%) adults aged ≥ 18 years; blood alcohol concentrations (BAC) available for 83%.</p> <p>Location: Ireland.</p>	<p>Of the 129 deaths, 55 (42.6%) were road traffic accidents, 31 (24.0%) suicides, 12 (9.3%) substance misuse, 11 (8.5%) house fires, 7 (5.4%) industrial and farming accidents and 13 (10.1%) classified as other accidents.</p> <p>Of the 55 who died in road traffic accidents, 22 (40%) had positive BACs ranging from 16mg per 100ml to 325mg per 100 ml.</p> <p>Of the 31 who died as a result of suicide, 16 (55.5%) had positive BACs ranging from 13mg to 100ml to 317mg per 100 ml.</p> <p>Of the 11 who died in house fires, the mean BAC was 225.2mg per 100ml.</p> <p>None who died as a result of an industrial or farming accident had alcohol detected in their blood.</p>
<p>Cherpitel CJ 2007</p> <p>Study Design: Systematic Review</p> <p>Class: M</p> <p>Rating: </p>	<p>N=56 international references reviewing emergency room studies on alcohol and injury, using representative probability samples of adult injury patients.</p>	<p>Findings supported prior reviews:</p> <p>Injured patients more likely to be positive for BAC and report drinking within six hours prior to injury than non-injured patients, and the magnitude of the association substantially \uparrow for violence-related injuries compared to non-violence-related injuries.</p> <p>However, indicators of alcohol use disorders did not show a strong association with injury.</p>
<p>Driscoll et al 2004</p> <p>Study Design: Retrospective</p>	<p>Review of deaths in the National Coroners Information System (NCIS) from July 2000 to June 2001.</p>	<p>Level of blood alcohol ranged from 0g per 100ml in 47% of cases to 0.10g per ≥ 100ml in 12% of cases.</p> <p>Alcohol contributed to ~19% of these</p>

<p>Cohort Study</p> <p>Class: B</p> <p>Rating: </p>	<p>N=6,259 total deaths that were not classified as natural cause deaths and 289 drowning deaths were identified; valid blood alcohol measurements were available for 137 (58%) deaths.</p> <p>Location: Australia.</p>	<p>fatal drowning incidents (25% for recreational aquatic activity, 16% for incidental falls into water and 12% for drowning due to suicide), with blood alcohol levels for these cases ranging from 0.020g per 100ml to 0.375g per 100ml.</p> <p>Using >0.10g per 100ml as the cut-off, the estimated all-ages proportion of unintentional drowning attributed to alcohol was 17%.</p>
<p>Driscoll, Harrison and Steenkamp 2004</p> <p>Study Design: Systematic Review</p> <p>Class: M</p> <p>Rating: </p>	<p>N=65 international references assessing the role of alcohol in drowning associated with recreational aquatic activity.</p> <p>Of the 65 references, 10 were studies regarding alcohol involvement in deaths arising from recreational swimming, 13 were studies regarding alcohol involvement in deaths arising from recreational boating and five were published estimates of risk or RR of fatal injury in relation to recreational aquatic activity.</p>	<p>Surveys have consistently stated that ~30% to 40% of people on boats drink alcohol while on board, that men tend to drink more and behave in higher-risk aquatic activities in association with drinking than women and that boater training is inadequate.</p> <p>Drowning appears to be the overwhelming cause of death associated with recreational aquatic activity with alcohol detected in the blood of 30% to 70% of persons; alcohol may contribute to 10% to 30% of all recreational drowning deaths.</p> <p>Studies suggest that persons with a blood alcohol level of 0.10g per 100ml have about 10 times the risk of death associated with recreational boating compared with persons who have not been drinking; the risk of drowning ↑ with ↑ blood concentration of alcohol.</p>
<p>Gonzalez-Wilhelm 2007</p> <p>Study Design: Systematic Review</p> <p>Class: M</p> <p>Rating: </p>	<p>N=31 international studies.</p> <p>Of the 31 studies, 11 represented studies of fatally injured drivers, nine represented studies of drivers who survived road traffic accidents, two represented studies of drivers primarily suspected of driving under influence of alcohol and nine represented studies of</p>	<p>Alcohol was the predominant substance, with prevalence of 22.2% to 57.1% in studies of fatally injured drivers, 20.0% to 26.0% in studies of drivers who survived road traffic accidents, 88.1% to 95.5% in studies of drivers primarily suspected of driving under influence of alcohol and 25.8% to 49.2% in studies of drivers primarily suspected of</p>

	drivers primarily suspected of driving under influence of drugs.	driving under influence of drugs. However, in studies of drivers primarily suspected of driving under influence of drugs, cannabinoids were more prevalent (26.1% to 59.3%).
<p>Hall et al 2009</p> <p>Study Design: Retrospective Cohort Study</p> <p>Class: B</p> <p>Rating: </p>	<p>Cases identified by searching the database of vital records at the Health Statistics Center of the West Virginia Department of Health and Human Resources for death certificates from 2004 to 2006.</p> <p>During that time, 112 fatal all-terrain vehicle crashes identified; 101 (90.2%) were male, aged eight to 88 years (mean 35 years).</p> <p>Toxicologic testing completed on 104 (92.9%) decedents.</p> <p>Location: United States.</p>	<p>Of 104 (92.9%) decedents with toxicologic testing, 60 (57.7%) were positive for either alcohol or drugs of abuse, including opioid analgesics, diazepam, marijuana, cocaine and methamphetamine.</p> <p>Regardless of type of crash (traffic vs. non-traffic), 51 (49%) of decedents were positive for alcohol, and of those, 88% had BACs >0.08% (mean = 0.17%).</p>
<p>Hingson and Zha 2009</p> <p>Study Design: Prospective Cohort Study</p> <p>Class: B</p> <p>Rating: </p>	<p>Interviews were conducted from 2001 to 2002 (wave one) in 43,093 adults aged ≥ 18 years (mean 45 years) from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC).</p> <p>N=34,653 adults re-interviewed from 2004 to 2005 (wave two).</p> <p>Location: United States.</p>	<p>Analyses revealed that the younger the respondents were when they started drinking, the \uparrow likelihood that, between the waves, they experienced alcohol dependence/abuse, drank five drinks per occasion at least weekly, drove under influence of alcohol and placed themselves in situations after drinking where they could be hurt.</p> <p>In addition, between waves, respondents who began drinking at earlier ages remained more likely to have unintentionally injured themselves and someone else when under influence of alcohol.</p> <p>When respondents were under the influence of alcohol, 20% of those injured were other people, with >one-third in traffic crashes.</p>

<p>Hingson et al 2009</p> <p>Study Design: Cross-sectional Study</p> <p>Class: D</p> <p>Rating: </p>	<p>Out of 5,778 current or former drinkers aged 18 to 39 from national sample responding to a screening e-mail, 4,021 completed the survey (3,409 completed the survey online, 612 completed the survey by telephone).</p> <p>Of the 4,021 completing the survey, 1,225 were aged 18 to 25 years, 1,793 were aged 26 to 35 years and 787 were aged 36 to 39 years.</p> <p>Location: United States.</p>	<p>Among all respondents, 38% had been a driver in a motor vehicle crash and 14% of those drivers were in accidents that occurred after they had been drinking; 34% reported being in a physical fight and 64% of them were in fights that occurred after drinking, and 27% had been accidentally injured, with 50% of them injured after drinking.</p> <p>Compared with persons who waited until age ≥ 21 years to start drinking, those who started drinking at age 14 years had 6.3 (95% CI: 2.6, 15.3) greater odds of having been in a motor vehicle crash after drinking, 4.6 (95% CI: 2.4, 8.7) greater odds of having been in a physical fight after drinking, and 5.2 (95% CI: 2.7, 10.2) greater odds of having been accidentally injured after drinking.</p>
<p>Johnston and McGovern 2004</p> <p>Study Design: Prospective Cohort Study</p> <p>Class: B</p> <p>Rating: </p>	<p>Total of 351 healthy adults presenting to the Ulster Hospital between November 2001 and July 2002 with fall injuries were included in the analysis</p> <p>N=113 had consumed alcohol and 238 had not, based on appearance and BACs were measured for 47 patients giving consent.</p> <p>Location: Ireland.</p>	<p>Significant difference in pattern of injury between those who had consumed alcohol and those who had not ($P < 0.001$) and significant difference between groups in the Injury Severity Scores ($Z = -2.5$, $P < 0.001$).</p> <p>For those who consumed alcohol, severity and pattern correlated with alcohol concentration at the time of injury:</p> <p>Patients with alcohol concentration $< 2\text{g per L}$ had mostly soft tissue limb injuries (58%), $2\text{g to } 2.5\text{g per L}$ had mostly significant limb fractures (55%) and $> 2.5\text{g per L}$ had mostly significant head injuries (90%).</p>
<p>Kool et al 2008</p> <p>Study Design: Population-based Case-Control Study</p>	<p>Cases identified through each of three trauma admitting hospitals for region and Coroner's office, and controls comprised random sample of people from General and Maori electoral rolls in the region.</p>	<p>Consumption of \geq two standard alcoholic drinks in preceding six hours relative to none was associated with significantly \uparrow risk of fall-related injury [for two standard drinks: OR=3.7 (95% CI: 1.2 to 10.9),</p>

<p>Class: C</p> <p>Rating: </p>	<p>Interviews conducted by telephone or face-to-face and proxy interviews with next-of-kin or close friends undertaken for cases who had died or who were too unwell to be interviewed.</p> <p>Total of 335 cases (180 females, 155 males, mean age 45.9 years) and 352 controls (208 females, 144 males, mean age 44.6 years) interviewed; blood alcohol measurements only available for cases.</p> <p>Location: New Zealand.</p>	<p>for \geqthree drinks: OR=12.9 (95% CI: 5.2 to 31.9)].</p> <p>~20% of unintentional falls at home may be attributable to consumption of \geqtwo drinks in preceding six hours.</p>
<p>Kool et al 2009</p> <p>Study Design: Systematic Review</p> <p>Class: M</p> <p>Rating: </p>	<p>Eight studies published in United States, Finland, Sweden and Canada appraised the published epidemiological evidence quantifying the risk of falls associated with acute and usual alcohol consumption among young and middle-aged adults.</p> <p>Of the eight studies:</p> <ul style="list-style-type: none"> • Four case-control studies • Three cohort studies • One case-crossover study. 	<p>Proportion of fall subjects who had been drinking within six hours of event ranged from 14% to 53%; acute alcohol use accounted for at least a three-fold \uparrow in unintentional fall risk.</p> <p>Modest evidence of a dose-response relationship with acute alcohol use was observed; however, association between usual alcohol use and fall risk was inconclusive.</p>
<p>Kurzthaler et al 2005</p> <p>Study Design: Case-Control Study</p> <p>Class: C</p> <p>Rating: </p>	<p>Cases were patients admitted to the emergency room injured by falls over a 12-month period, and controls were patients admitted for accidents of other causes.</p> <p>Total of 615 cases (44.1% male, 55.9% female, mean age 64.8 ± 20.8 years) and 996 controls (74.1% male, 25.9% female, mean age 40.5 ± 16.2 years) included.</p> <p>Location: Austria.</p>	<p>Of the 615 cases, 22% tested positive for alcohol, 55% tested positive for benzodiazepines and 1.5% tested positive for both substances.</p> <p>Significant number of males tested positive for alcohol than females (40.2% vs. 7.6%).</p> <p>Percentage of both male and female patients who had consumed alcohol at the time of accident \downarrow significantly with age, across all age groups ($P < 0.001$).</p> <p>In persons up to 70 years of</p>

		<p>age, consumption of alcohol in males and females substantially ↑ in patients hurt by sudden fall (males 49.7%, females 18.9%), than in age-matched sample of patients involved in accidents of other causes (males 20.6%, females 3.1%, $P<0.001$).</p>
<p>Levy DT, Mallonee S et al, 2004</p> <p>Study Design: Cross-Sectional Study</p> <p>Class: D</p> <p>Rating: </p>	<p>Data from 1988 to 1992 on 11,376 persons were obtained from a statewide, population-based injury surveillance system in Oklahoma.</p> <p>Alcohol involvement and outcome of injury (both fatal or non-fatal) by sex, age, race, time and cause of injury using multiple years of data on fire and scald burns, submersions, spinal cord injuries and traumatic brain injuries.</p> <p>Location: United States.</p>	<p>Fire burns:</p> <p>Mean alcohol involvement significantly ↑ among persons killed than among survivors (30.7% vs. 11.0%, $\chi^2=101.1$, $P<0.001$).</p> <p>Among persons intentionally burned by fires/flames, alcohol involvement was similar for fatal (28.2%) and non-fatal (32.6%) cases ($\chi^2=0.2$, NS).</p> <p>↑ percentage of fatal non-work-related unintentional cases (32.5%) than non-fatal cases (11.7%) were alcohol involved ($\chi^2=88.8$, $P<0.001$).</p> <p>Among non-fatal cases, ↑ percentage of non-work-related unintentional injuries (11.7%) than work-related unintentional injuries (3.1%) were alcohol involved ($\chi^2=14.8$, $P<0.001$).</p> <p>Alcohol involvement in non-work-related fire burns lowest among victims aged zero to 14 for both fatalities and injuries.</p> <p>Fire burns:</p> <p>Excluding work-related fire burn cases, alcohol-involved burn victim was >five times as likely to die as a non-alcohol-involved fire burn victim ($P<0.001$).</p> <p>Burns that occurred at nighttime ($P<0.001$) and to those >65 years ($P<0.01$) had the greatest likelihood of being fatal.</p>

Burns to those aged 15 to 24 years ($P<0.01$), male ($P<0.05$), and non-Caucasian ($P<0.05$) were the least likely to be fatal.

Tobacco involvement also nearly doubled the risk of dying ($P<0.001$).

Scalds and other burns:

Mean alcohol involvement similar among persons killed and among survivors (5.6% vs. 3.8%, $\chi^2=0.2$, NS).

All cases of intentional scald burns and unintentional work-related scald burns were non-fatal; alcohol involvement was 8.8% and 2.0%, respectively.

Because of small sample size of fatal non-work-related scald victims, comparisons not made between fatal and non-fatal cases.

Submersions:

Total alcohol involvement similar for unintentional (23.9%) and intentional (17.4%) cases ($\chi^2=0.5$, NS).

Fatal cases significantly more likely to be alcohol involved (31.0%) than non-fatal cases (6.2%) ($\chi^2=43.0$, $P<0.001$).



Alcohol-involved submersion cases were >two times more likely to be fatal than non-alcohol-involved cases ($P=0.08$), even when controlling for victim age.



Submersions that occurred at night ($P<0.01$) and in boating incidents ($P=0.06$) more likely to be fatal, and female victims were less likely to die.



Victims age ≥ 15 years were six to 15 times more likely to be fatal cases than victims <age 15 ($P<0.001$).



Spinal cord injuries:

		<p>Alcohol involvement between fatal and non-fatal cases (33.3% vs. 34.1%, $\chi^2=0.1$) NS.</p> <p>Among SCI cases associated with motor vehicle crashes, total alcohol involvement slightly \uparrow among non-fatal cases (42.3%) than among fatal cases (34.2%) ($\chi^2=2.4$, NS).</p> <p>Among non-fatal SCI cases, alcohol involvement nearly twice as \uparrow in intentional (48.4%) than in unintentional (25.8%) injuries ($\chi^2=12.4$, $P<0.001$).</p> <p>Victims ages 15 to 24 less likely to die ($P<0.05$) and victims ages ≥ 65 years were nearly four times more likely to die ($P<0.01$) than victims in other age groups.</p> <p>Traumatic brain injury:</p> <p>Of cases with known alcohol involvement, 38.5% of fatal and 42.3% of non-fatal cases were victim alcohol-involved ($\chi^2=4.8$, $P<0.05$).</p> <p>Among intentional injuries, 37.9% of fatalities and 70.4% of survivors were alcohol involved ($\chi^2=119.0$, $P<0.001$).</p> <p>Alcohol involvement was \uparrow among males (45% of cases) than females (27% of cases) ($\chi^2=117.2$, $P<0.001$).</p> <p>Nighttime and alcohol-involved injuries slightly less likely to be fatal ($P<0.001$), and cases aged ≥ 15 years and involving females more likely to be fatal compared to those $< \text{age } 15$ ($P<0.001$ for all four variables).</p>
<p>McDonald, Wang and Camargo 2004</p> <p>Study Design: Trend Study</p>	<p>Data from the National Hospital Ambulatory Medical Care Survey (NHAMCS) from 1992 through 2000.</p>	<p>Number of alcohol-related visits \uparrow 18% during the nine-year period.</p> <p>Emergency department visit rates for diagnoses with alcohol-attributable</p>

<p>Class: D</p> <p>Rating: </p>	<p>During these nine years, there were an estimated 68.6 million (95% CI: 65.6 to 71.7 million) emergency department visits attributable to alcohol, a rate of 28.7 (95% CI: 27.1 to 30.3) per 1,000 US population.</p> <p>Location: United States.</p>	<p>fractions or one were highest for those who were aged 30 to 49 years, male and black.</p>
<p>McLean R and Connor J 2009</p> <p>Study Design: Cross-sectional Survey</p> <p>Class: D</p> <p>Rating: </p>	<p>N=317 men and women, age 16 to 84 years who were admitted to three primary care facilities over a two-month period.</p> <p>Anonymous survey provided information about the nature of injury, alcohol use in the six hours prior to injury and identification of location where the 'last drink' was consumed.</p> <p>Location: New Zealand.</p>	<p>17% of people aged 16 years consumed an alcoholic drink in the six hours prior to injury.</p> <p>Of this group, 36% had had moderate intake of alcohol and 64% a hazardous intake (P=0.002).</p> <p>Mean number of standard drinks consumed was nine.</p> <p>Tertiary students and young people more likely to have been drinking than others (P<0.001).</p> <p>Greater proportion of women (24%) had been drinking prior to injury than men (11%) (P=0.005).</p> <p>Majority of drinkers (62%) had their last drink at a house or flat.</p> <p>Mean age of drinkers 21 years (95% CI: 19.6 to 22.8 years) and of non-drinkers 35 years (95% CI: 32.8 to 36.6 years).</p> <p>Statistically significant difference between the groups (P<0.0001) with respect to age.</p>
<p>Mukamal KJ, Mittleman MA et al, 2004</p> <p>Study Design: Trend Study</p> <p>Class: B</p>	<p>Initial N=5,888, final N=5,841 [5,201 participants from the Cardiovascular Health Study (original cohort) and 687 new, black participants (new cohort)].</p> <p>Men and women were >65 years.</p> <p>Location: United States.</p>	<p>Cross-sectional analysis showed that before and after adjustment, prevalence of frequent falls highest in abstainers and lowest in subjects who consumed ≥ 14 drinks per week (P=0.06).</p> <p>Longitudinal analysis resulted in no difference between abstainers and light to moderate drinkers in their risk of falls during follow-up.</p>

<p>Rating: </p>		<p>Subjects that consumed ≥ 14 drinks per week had significantly \uparrow risk of falls than abstainers in adjusted analyses (OR=1.25, 95% CI: 1.03 to 1.52, P=0.07).</p> <p>HR for incident falls associated with consumption of ≥ 14 drinks per week was 1.20 (95% CI: 0.97 to 1.47) for white subjects and 1.51 (95% CI: 0.78 to 2.91) for black subjects.</p>
<p>Rehm J, Patra J et al, 2006</p> <p>Study Design: Cross-Sectional Study</p> <p>Class: D</p> <p>Rating: </p>	<p>Initial N=13,090; final N=47% response rate.</p> <p>Age: ≥ 15 years.</p> <p>Randomly drawn sample from data taken from Canadian Addiction Survey collected between 2003 and 2004.</p> <p>Subjects completed questionnaire via telephone.</p> <p>Location: Canada.</p>	<p>Men consumed on average more than women and alcohol consumption \downarrow with age.</p> <p>Overall average age for an alcohol-attributable death was 45.9 years for men and 58.8 years for women.</p> <p>3,892 alcohol-attributable deaths estimated accounting for 3,313 deaths among men and 579 among women.</p> <p>Numbers derived by multiplying Alcohol Attributable Fractions with number of deaths for each category.</p> <p>Among deaths caused by alcohol, the three biggest contributors were unintentional injuries, malignant neoplasms and digestive diseases.</p> <p>With respect to single disease categories, cirrhosis of the liver, motor vehicle accidents, suicides/self-inflicted injuries, oesophageal cancer and cardiac arrhythmias constituted the largest alcohol-attributable categories.</p> <p>Potential Years of Life Lost rate for Canada for deaths due to alcohol was 769 per 100,000 for men and 203 per 100,000 for women aged zero to 80+ years.</p> <p>For every 100,000 people in population,</p>













		<p>a potential loss of 769 years of life among men and 203 years of life among women as a result of premature death due to alcohol.</p> <p>A high PYLL rate for men observed, indicating ↑ levels of premature mortality among men compared to women.</p>
<p>Sorock et al 2006</p> <p>Study Design: Case-Control Study</p> <p>Class: C</p> <p>Rating: </p>	<p>Total of 1,735 cases (389 males, 339 females, aged ≥55 years) selected from 1993 National Mortality Follow-Back Survey, which provided national estimates of alcohol usage and demographic information among people who died from injuries.</p> <p>N=13,381 controls (5,065 males, 8,316 females, aged ≥55 years) selected from 1992 National Longitudinal Alcohol Epidemiologic Survey, which provided national estimates of alcohol usage for the general public.</p> <p>Location: United States.</p>	<p>Analysis indicated that 36% of cases and 29% of controls consumed ≥12 drinks in the prior 12 months.</p> <p>Unadjusted relative odds for drinkers vs. non-drinkers for falls was 1.7, for motor vehicle crashes was 1.7 and for suicides was 1.6.</p> <p>Drinking ↑ risk of suicide more for women than for men; the adjusted OR of suicide for women drinkers vs. non-drinkers was 2.5 (95% CI: 1.67 to 3.68), while for men drinkers vs. non-drinkers was 1.3 (95% CI: 1.00 to 1.65).</p>
<p>Watt et al 2004</p> <p>Study Design: Case-Control Study</p> <p>Class: C</p> <p>Rating: </p>	<p>Of 727 patients aged ≥15 years that were treated at emergency department for injury, 543 were interviewed and 488 (311 males, 177 females) were included in the analysis, as well as 488 population controls matched for gender, age group, neighborhood, day and time of injury.</p> <p>Location: Australia.</p>	<p>After controlling for demographic and situational variables, consuming any alcohol in the six hours prior to injury significantly ↑ risk of injury [OR=2.13 (95% CI: 1.3 to 3.9)], and drinking at levels above low-risk guidelines (>40g alcohol per occasion for females, >60g alcohol per occasion for males) ↑ injury risk by a factor of ~2.5 [OR=2.41 (95% CI: 1.1 to 5.2)].</p> <p>In addition, drinking beer [OR=1.86 (95% CI: 0.9 to 3.9)], spirits [OR=3.05 (95% CI: 1.1 to 8.2)] or combination of beverages [OR=3.16 (95% CI: 1.1 to 8.8)] ↑ risk of injury.</p>

		When usual alcohol consumption patterns, risk-taking behavior and substance use were considered, Δ in the effect of alcohol on injury risk observed, demonstrating that relationship between alcohol and injury appears confounded by these variables.
<p>Watt et al 2006</p> <p>Study Design: Cross-sectional Study</p> <p>Class: D</p> <p>Rating: </p>	<p>Every injured patient who presented to the Gold Coast Hospital Emergency Department for treatment of an injury sustained <24 hours prior to presentation was approached for an interview.</p> <p>N=1,205 patients approached, 789 were eligible and 593 injured patients (377 males, 216 females) included in the final analysis (aged >15 years).</p> <p>Location: Australia.</p>	<p>After adjustment for confounding variables, neither quantity nor type of alcohol was associated with injury mechanism; however, drinking setting significantly associated with odds of sustaining an intentional vs. unintentional injury [OR=2.79 (95% CI: 1.4 to 5.6)], injury through being hit by or against something vs. other injury types [OR=2.59 (95% CI: 1.4 to 4.9)].</p> <p>↓ odds of sustaining an injury through road traffic crashes vs. non-road traffic crashes [OR=0.02 (95% CI: 0.004 to 0.9)], compared with not drinking alcohol prior to injury.</p>
<p>Yoonhee C, Jung K et al 2009</p> <p>Study Design: Case-Control Study</p> <p>Class: C</p> <p>Rating: </p>	<p>Of 1,188 patients requiring admission, majority did not provide consent.</p> <p>O 407 patients, there were 123 cases in the intoxicated group (male:female ratio = 7.1:1, mean age 39±13.7 years) and 284 non-intoxicated controls (male:female ratio = 2.1:1, mean age 45.6±19.0 years).</p> <p>Location: South Korea.</p>	<p>Head Abbreviated Injury Scale (AIS) score significantly ↑ in intoxicated patients compared to non-intoxicated controls (1.1±1.7 vs. 0.6±1.2, P=0.008) and mortality significantly ↑ in intoxicated patients than non-intoxicated controls (5.7% vs. 2.0%, P=0.003).</p> <p>Significantly ↑ number of intoxicated patients with severe injuries than non-intoxicated controls (21% vs. 11.7%, P=0.023) and specifically with head injuries (25.7% vs. 13.3%, P=0.004).</p> <p>NS difference in total length of hospitalization, but length of the ICU admission significantly longer in intoxicated patients than in non-intoxicated controls (1.9±4.6</p>

Research Design and Implementation Rating Summary

For a summary of the Research Design and Implementation Rating results, [click here](#).

Worksheets

-  [Bedford D, O'Farrell A, Howell F. Blood alcohol levels in persons who died from accidents and suicide. *Ir Med J*. 2006 Mar;99\(3\):80-3.](#)
-  [Cherpitel CJ. Alcohol and injuries: a review of international emergency room studies since 1995. *Drug Alcohol Rev*. 2007 Mar;26\(2\):201-14.](#)
-  [Driscoll TR, Harrison JE, Steenkamp M. Alcohol and drowning in Australia. *Injury Control and Safety Promotion* 2004;11\(3\):175-181.](#)
-  [Driscoll TR, Harrison JE, Steenkamp M. Review of the role of alcohol in drowning associated with recreational aquatic activity. *Injury Prevention* 2004;10:107-113.](#)
-  [González-Wilhelm L. Prevalence of alcohol and illicit drugs in blood specimens from drivers involved in traffic law offenses. Systematic review of cross-sectional studies. *Traffic Inj Prev*. 2007 Jun;8\(2\):189-98.](#)
-  [Hall AJ, Bixler D, Helmkamp JC, Kraner JC, Kaplan JA. Fatal all-terrain vehicle crashes: injury types and alcohol use. *Am J Prev Med*. 2009 Apr;36\(4\):311-6. Epub 2009 Feb 7.](#)
-  [Hingson RW, Zha W. Age of drinking onset, alcohol use disorders, frequent heavy drinking, and unintentionally injuring oneself and others after drinking. *Pediatrics*. 2009 ;123\(6\):1477-84.](#)
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-  [Johnston JJ, McGovern SJ. Alcohol related falls: an interesting pattern of injuries. *Emerg Med J*. 2004 Mar;21\(2\):185-8.](#)
-  [Kool B, Ameratunga S, Robinson E, Crengle S, Jackson R. The contribution of alcohol to falls at home among working-aged adults. *Alcohol*. 2008 Aug;42\(5\):383-8. Epub 2008 Jun 17.](#)
-  [Kool B, Ameratunga S, Jackson R. The role of alcohol in unintentional falls among young and middle-aged adults: a systematic review of epidemiological studies. *Inj Prev*. 2009 Oct;15\(5\):341-7.](#)
-  [Kurzthaler I, Wambacher M, Golser K, Sperner G, Sperner-Unterweger B, Haidekker A, Pavlic M, Kemmler G, Fleischhacker WW. Alcohol and benzodiazepines in falls: an epidemiological view. *Drug Alcohol Depend*. 2005 Aug 1;79\(2\):225-30.](#)

-  [Levy DT, Mallonee S, Miller TR, Smith GS, Spicer RS, Romano EO, Fisher DA. Alcohol involvement in burn, submersion, spinal cord, and brain injuries. *Med Sci Monit.* 2004; 10\(1\): CR17-CR24.](#)
-  [McDonald AJ 3rd, Wang N, Camargo CA Jr. US emergency department visits for alcohol-related diseases and injuries between 1992 and 2000. *Arch Intern Med.* 2004 Mar 8;164\(5\):531-7.](#)
-  [McLean R, Connor J. Alcohol and injury: a survey in primary care settings. *N Z Med J.* 2009 Sep 25;122\(1303\):21-8.](#)
-  [Mukamal KJ, Mittleman MA, Longstreth WT Jr, Newman AB, Fried LP, Siscovick DS. Self-reported alcohol consumption and falls in older adults: Cross-sectional and longitudinal analyses of the cardiovascular health study. *J Am Geriatr Soc.* 2004 Jul; 52\(7\): 1,174-1,179.](#)
-  [Rehm J, Patra J, Popova S. Alcohol-attributable mortality and potential years of life lost in Canada 2001: Implications for prevention and policy. *Addiction.* 2006; 101 \(3\): 373-384.](#)
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-  [Yoonhee C, Jung K, Eo E, Lee D, Kim J, Shin D, Kim S, Lee M. The relationship between alcohol consumption and injury in ED trauma patients. *Am J Emerg Med.* 2009 Oct;27\(8\):956-60.](#)